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ABSTRACT

The interplay of historical, technological, legal, and economic events that surrounded the strident controversies involving two competing 1890s composing machines--John R. Rogers's Typograph and Ottmar Mergenthaler's Linotype--is examined in this paper. Using patent copies, court documents, trade journal reports and newspaper articles of the era, and press association accounts, the paper identifies and analyzes the roles of the combatants, their machines and patents, and the underlying forces involved in technological change. The paper first introduces briefly the economic and social concepts that had a bearing on the Mergenthaler-Rogers controversy and on the diffusion of the Linotype. The paper recounts the technological progress of typography from Gutenburg's movable type through the 1890s, and provides biographical information on Rogers and Merganthaler. This is followed by accounts of the injunction brought by Merganthaler's company against the Rogers's machine, on the claim that the letter infringed upon the Mergenthaler patents, and of the competition ensuing from introduction of Rogers's Typograph. The paper then discusses an impression-type composer developed by J.W. Shuckers, with whose company Rogers subsequently merged, and the counter-infringement suit brought against Mergenthaler for use of Shuckers's spaceband mechanism. Finally, the paper discusses Mergenthaler's acquisition of the Rogers firm in 1895 and the particulars of the purchase, as well as Rogers's subsequent work in the Mergenthaler organization and Shuckers's obscurity once the patent for his spaceband mechanism was bought out. (Copies of ads for the two machines are included.)(HTH)

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History Division

ROGERS' TYPOGRAPH VERSUS MERGENTHALER'S LINOTYPE: THE PUSH AND SHOVE OF PATENTS AND PRIORITY IN THE 1890s

by

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This descriptive monograph examines the interplay of historical, technological, legal and economic events that surrounded the strident controversies involving two competing 1890s composing machines: John R. Rogers' Typograph and Ottmar Mergenthaler's Linotype.

The distinct role of the Rogers machine as a potential deterrent to the successful adoption of the Linotype in the 1890s has long remained obscured in federal court reports and other documents. And Rogers' involvement with the later development of the Linotype itself has been largely unremembered by an industry that has practically passed beyond the hot-metal composing process first made feasible by the Linotype. By the use of patent copies, court documents, trade journal reports and newspaper articles of the era, and press association accounts, the author has sought to identify and analyze the roles of the combatants, their machines and patents, and the underlying forces involved in technological change.

The research, it should be noted, uses in part accounts appearing in Inland Printer, Journalist and Fourth Estate in the 1890s. These trade journals ---Allan Forman's Journalist in particular---were prone to take sides in the mechanical controversies. Like the printers themselves, the editors were often skeptical that any machine could replace the skill and adeptness of hand compositors. And they had their favorites. Even with this sort of a disclaimer of exact credibility, the use of these sources helps re-create the conflicting viewpoints that abounded in that era. Future research into the papers--should they be available--of some of the principals might allow additional insights.

Patterns, Factors and Concepts

From a mere antiquarian perspective, the conflicts could be said to concern the question of who invented what first. Mergenthaler, Rogers and a third inventor, J. W. Schuckers,--apparently independently of each other--patented machines or devices that would allow printing type or lines to be set mechanically. Infringement suits in the 1890s upheld Mergenthaler over Rogers. Yet the Mergenthaler company, in 1895, bought out Rogers' spaceband rights in order to maintain the Linotype's singular integrity at a time when that machine was being widely adopted in U.S. composing rooms.

Certainly the patented ideas of Mergenthaler, Rogers and Schuckers constituted highly significant advances in composing procedures, and the patent and legal systems documented their inventiveness. Yet their ideas did not generate in a vacuum, but from a pattern evident in the history of technology: that of adapting complementary technologies already in place.[1] Thus Mergenthaler, for example, built upon typefounders' single matrices for the idea of using single circulating matrices in his Linotype. Later improvements

to the machine demonstrated this progressive pattern.

A great deal more, however, exists below the antiquarian surface. The rise of the Linotype and the concurrent defeat of the Typograph illustrate the economic importance of a vital new technology. Thus the controversies were embedded within a wide range of factors linked not only to technological changes but also to economic considerations, principally those that would allow expansion and greater productivity at U.S. newspapers. The Mergenthaler-Rogers conflicts and their lengthy progression through the court system involved the question of who was going to control the use and spread of the hot-metal composing process and, indeed, who was going to profit from the critical course of the marketplace.

Conceptually, the adoption of the Linotype can be considered a classic example of Everett Rogers' decision process for the diffusion of innovations.[2] Awareness was demonstrated by word-of-mouth reports and articles about the machine(s), interest by discussions at press association meetings, evaluation by inspecting the machines and gaining reports on their success and failures, small-scale trials at several large daily newspapers, and then the adoption-rejection decisions. Although some dailies temporarily rejected Linotypes because of their early defects, because of publishers' loyalties to hand compositors and because of the costs and uncertainties of a new process, most (if not all) of them eventually adopted the hot-metal composing process.

It can be said that the Mergenthaler company geared its activities to gain a favorable adoption decision. Certainly newspapers and commercial printers in the late 1880s and into the 1890s were wary of an unproved device even though some visionaries viewed mechanical composition as a way to lower costs, speed up production and increase profits. Hand compositors perceived the

"mechanical wonder" as a threat to their well-entrenched livelihood. And manufacturers of early machines that mechanically set already-cast printer's type believed the Linotype would severely harm their fledging businesses.

An explication of the Mergenthaler-Rogers controversies illuminates the interdependence of technology and the wider social and economic factors that surrounded them. Certainly the arrival of the Rogers machine posed a distinct threat to the Mergenthaler Printing Company's beginning efforts to dominate newspaper composing rooms. Why and how that company proceeded to defeat the Rogers machine, and why and how it bought out Rogers' spaceband rights in 1895, demonstrate the extent to which economic factors prevailed in the marketplace and in the diffusion of the innovative Linotype.

The Setting

The process of composing printer's type existed practically unchanged for nearly 400 years after Johann Gutenberg invented movable type in Germany in the 1450s. For centuries, the hand compositor stood before the type cases as he or she picked up each leaden character in order and placed it in the composing stick. In the succeeding justifying process, spaces were added between words so that the type line's right and left sides would be even. After use, the type was distributed by hand to the proper compartments in the case so that it could be used again for the next news article or printing job.

The first efforts to set type mechanically are believed to have begun in Great Britain. Printing historians[3] generally consider Dr. William Church as the first inventor of a new process. A Vermonter trained in medicine, Church patented a typesetter design in England in 1822. His composing-system ideas apparently were too advanced for his day, for no records have been found to

to indicate that his typesetter was ever built.

American invention began with William H. Mitchel's 1850 Composer, a device arranged somewhat like a pianoforte, and Timothy Alden's 1857 Typesetter Both machines, like many others that followed, utilized keyboards, assembly channels and precast foundry type that was usually nicked on the side to allow distribution to the proper storage channel. Alden's machine seemed so promising to the New York Times that it ordered 12 of them in 1862. The newspaper itself called the machine "the invention of the Nineteenth Century" and predicted that a "new era in newspaper publishing will date from the day of introduction."[4] No confirmation could be found to indicate that the Aldens were actually used (or even installed) at the Times.

After the Civil War's end, new efforts arose to perfect a composing machine as the United States moved into a growth era for the print media. Enthusiasm for developing such a machine was likely stimulated by the New York World's declaration that "it is discreditable to the inventive genius of this country that the one great mechanical want of the time [a mechanical composer] is still unsupplied." In its article reprinted in Scientific American in 1869, the World reported that newspapers were prevented from "giving their readers the literal 'volumes' of matter they would gladly do from day to day were they not hampered by the delays and cost of composition."[5] Although the World proposed to establish a prize fund of $500,000, no documents have been located to confirm that the money was raised or that any prize was awarded to an inventor.

Composing machines developed between 1850 and the mid-1890s fell into three main categories: the typesetters, the impression-type composers and the linecasters. The typesetters sought to duplicate in some way the work of the hand compositor. This class included the Mitchel and Alden machines as well as

those developed by Joseph Thorne, James W. Paige (with Mark Twain's backing) and others. They all used type that had been cast at typefoundries and required up to three people for their operation. Although many patents were granted for the typesetters, their use generally was limited to weekly newspaper and some book publishers. The adoption of the Linotype gradually led to their obsolescense, and by the 1920s they were practically extinct.

The quest for cheaper and speedier type composition stimulated inventors to develop two other processes in the 1880s: the impression-type composers and the linecasters. The impression composers generally required the pressing of hard type dies into a soft material from which lines were cast. Because of imperfect results, none of the several composers of this category ever became a commercial success. Yet both Mergenthaler and Rogers used that process as an intermediate stepping stone in the development of their linecasters. Machines of this latter category--the Linotype being the principal example--were operated by temporarily assembling type matrices (or molds). Hot lead was forced into the character depressions of the matrices so that a casting of each line could be produced. The linecasters used adjustable mechanical spacing devices to justify each line, and the mechanical distribution of the matrices allowed them to be used over and over.

The controversies examined in this paper concern not only the invention of the linecasting process but also the creation of the justifying mechanism known in the trade as the spaceband. The antagonists, of course, were Mergenthaler and Rogers, and to a lesser degree, J. W. Schuckers.

Mergenthaler and Rogers were practically the same age, but no evidence exists to indicate that they ever met. Both, though, were inventors at heart. Born in Germany in 1854, Mergenthaler trained as a watchmaker before coming to

the United States to work at a cousin's machine shop, first at Washington, D.C., and then Baltimore. His first introduction to the problems of type composition came when he remodeled a defective lithographic printing machine for another inventor in 1876. By 1883, he had invented his impression-type First Band Machine, a none-too-successful antecedent of the Linotype. Mergenthaler developed successive new models so that by 1886 he was building the prototype of the Blower Linotype first used commercially by the New York Tribune in July of that year. Mergenthaler was backed at that time by a syndicate of prominent metropolitan publishers anxious to use and promote a successful machine. The roll of first investors included Whitelaw Reid of the Tribune, W. N. Haldeman of the Louisville Courier-Journal, Victor Lawson and Melville Stone of the Chicago News, W. H. Rand of Rand, McNally & Company of Chicago, Stilson Hutchins of the Washington Post and William Henry Smith of the Associated Press.[6] At one point in the early days, the syndicate members granted themselves exclusivity privileges for the use of the machines in their respective cities.

The first Linotypes worked none too well in syndicate composing rooms, and by early 1888 syndicate president Reid told the company stockholders that the machines "so far had been a source of materially increased expense to every newspaper that has really attempted to use them."[7] Strained relations between Mergenthaler and Reid over the machine's deficiencies, the costs of the manufacturing plant at Baltimore and personnel polices led Mergenthaler to resign as the factory manager.

Reid moved the Linotype factory to Brooklyn, New York, so that he could give it closer supervision. Mergenthaler, now severed from the machine and company that bore his name (Mergenthaler Printing Company), re-established his machine shop in Baltimore. He set about improving the Linotype on his own,

developing new and improved models that were eventually manufactured by the Brooklyn operation. Mergenthaler, though, was never reconciled to the Brooklyn leadership, and he died from tuberculosis at 45 in 1899, embittered to the end over the way he and his invention had been treated by the then-prosperous organization then styled the Mergenthaler Linotype Company.[8]

Rogers, the Typograph inventor (not the same as the later Ludlow Typograph), was born in Illinois in 1856 and moved to Kentucky the next year when his parents helped establish the school that became Berea College. His interest in type composition was likely piqued by youthful experiences as a hand compositor at Berea. Rogers' college courses at Berea and Oberlin (Ohio) prepared him for teaching Greek and physics and for mechanical engineering.[9] He formulated a design for an impression-type composing system during the years he served as superintendent of schools at Lorain, Ohio. Patented in 1888, his system required three machines: one for preparing soft metal blanks, one for composing and then impressing the character dies into the blanks, and the third for casting the leaden lines. Two years later, Rogers patented his Typograph linecaster, a single machine that cast slugs or lines of type similar to those produced on the Linotype.

The third participant in the controversy was J. W. (Jacobs William) Schuckers (c. 1831-1901), one of the few composing machine inventors of the era with a practical printing background. His first newspaper work began at the age of 15 in the composing room of the Wooster (Ohio) Republican. In 1859 he was employed as a printer at the Cleveland Leader. Subsequently he became a clerk at the U.S. Treasury, the private secretary of Salmon P. Chase when he was Secretary of the Treasury, a beginning law student, a biographer of Chase, and an 1879 patentee of an impression-type composing machine.[10] A more important invention,

though, was his later mechanism designed to justify type lines.

The controversies described in this paper arose over inventor's patents, the "letters" issued by the federal government to grant to an inventor the exclusive right to make, use or sell an invention for a specific period of time. Legal action in patent litigation generally took the form of either an interference proceeding or an infringement suit. Interference proceedings were originated in the Patent Office to determine the priority of the invention between claimants. The legal path to settlement of the "first inventor" question usually involved several levels of appeal before resolution. Infringement suits were filed in the federal court system when a litigant claimed that there had been unlawful manufacture, use or sale of a patented article (or machine). The judge's issuance of an injunction (either temporary or permanent) would bar the manufacture, use or sale of the infringing device. Various appeals could delay the final settlement of these suits for years.

The Typograph and the Preliminary Injunction

Sometime in 1889, Rogers introduced his linecasting Typograph that had been built at a Cleveland factory. As on the Linotype, the Typograph operator assembled matrices preparatory to the casting of a line of type in hot lead that quickly cooled. Mergenthaler's matrices were small rectangular pieces of brass that circulated though the machine with the help of an ingenious distributing system. Rogers' linecaster, though, used long matrix bars positioned on wires that formed an elliptical frame. As the Typograph's keys were pressed, the matrices slid down the wires to the assembly and casting area. After the casting, the operator tipped the frame backwards to return the matrices to their original positions. This procedure caused a brief interruption in composition at

the end of each line.[11] On the Linotype, the distribution proceeded automatically. During the eight years of the Typograph's development, Rogers apparently knew nothing about the efforts of Mergenthaler or Schuckers.[12]

Both machines used mechanical spacing devices for justifying the line so that the margins would line up. Rogers' machine utilized an expandable three-piece disk. The Linotype, on the other hand, used a double-wedge device for spreading out the space between words. Mergenthaler's use of this device, even though he had patented it, later became a crucial element in patent litigation.

February 1890 was an important date for both machines and their inventors. Mergenthaler's improved (Square Base) model was demonstrated in New York City, and the company reportedly received orders "for several hundred machines" within a few months.[13] The company, it seemed, was on its way to revolutionize the printing industry. In that month, though, members of the American Newspaper Publishers Association (ANPA) learned of Rogers' machine and its early prospects for solving a long-sought need. G. F. Prescott of the Cleveland Plain Dealer advised the ANPA convention delegates that the Rogers was "the machine, notwithstanding the Mergenthaler or any other logotype machine." He urged publishers in this national organization not to invest their money in Mark Twain's typesetter or the Mergenthaler until they had seen the Rogers. Publishers who had viewed the machine in Cleveland told their compatriots that they were impressed by the Typograph's simplicity and by the fact that it used gravity for assembling the matrices (instead of the air blast used on the Blower Linotypes).[14]

When Mergenthaler company officials learned of the Rogers machine, the counsel, Philip T. Dodge, went to Cleveland to investigate. Dodge soon dispatched to the Rogers firm a legal notice that its machine infringed upon the Mergenthaler patents and that the new device was a "palpable imitation of the

leading features" of the Linotype. Dodge warned that his company "will proceed at once against you in the courts" on attempts "to sell or publicly operate any machine which trespasses upon their rights."[15]

The Rogers company ignored the notice and, in the words of an affidavit from Mergenthaler president Lemon G. Hine, "declared their intention to manufacture and lease their said machines . . . and offer [them] for use by the printing trade."[16] The Mergenthaler company followed the notice by publishing warning advertisements in the June 1890 issues of the trade magazines Inland Printer and the Journalist. The public was cautioned that "use of any machine which casts, as a substitute for movable type, linotypes or type bars . . . will render the user liable to a suit for infringement."[17] (See page 31.)

The notices did not deter Rogers and his backers from introducing the machine. In fact, a report in the Journalist indicated that the company had received orders for 600 machines, a figure that seems unreliable and cannot be substantiated.[18] The Typograph was exhibited at Joseph Pulitzer's New York World in September 1890. Through an ANPA bulletin, newspaper officials learned that eight pages of the a Sunday World had been set up on the Typograph. "In performing the work it was run 125 hours without any interruption and with no appearance of ill effects."[19] Scientific American reported that several New York daily publishers had "made arrangements to introduce the Rogers [as well as the Mergenthaler] machines into their composing rooms."[20] Although Typographs may have been installed at newspapers other than the World, no documenting reports have been found.

Rogers mounted a sales campaign that fall just as the Mergenthaler company abandoned its exclusivity arrangements and was delivering the first of its improved model to newspapers outside the original syndicate. One campaign

element was a New York Times endorsement highly favorable to the Typograph. The Times at that point used no linecasters, but the article stated that 50 Typographs would be installed there. Furthermore, the Times writer said publishers from Boston to St. Louis had visited Rogers' factory and left orders "for about nine hundred machines."[21] Publishers were clearly interested in machine composition, but the extent of those orders was likely overstated so as to impress them as they considered the new technology. A second element of the Rogers campaign was a low-key advertisement in the Journalist titled "Publishers Should See the Rogers Typograph." The machine could again be seen at the Pulitzer Building. The company said it guaranteed its patents as well as a composition speed of "not less than 3,000 ems per hour," a figure comparable to early Linotype results.[22]

Inventor Mergenthaler, as might be expected, was highly critical of the Typograph, calling it "the interloper" and "the pirate." In his Biography (an often critical autobiography), he described Rogers' invention as a "comparatively ineffective machine, a bold and barefaced imitation of the linotype." As to its introduction, he said the machine had been "advertised with as much energy and hornblowing as Barnum's Circus or Higgins Laundry Soap."[23]

The Mergenthaler firm would naturally view the arrival of a near competitor with some alarm, especially since it too was seeking an entree into the nation's composing rooms. But its strong adversarial weapons were the Mergenthaler patents, and the company went to great lengths and expense through the years to protect them.

The cumulative effect of the Rogers promotion led Mergenthaler officials to instigate infringement proceedings in a New York federal district court in late 1890.[24] An extensive array of affidavits from Mergenthaler officials and

Linotype users formed the basis of the initiating document submitted by the company. President Hine stated that about 170 Linotypes were then in use and that the company was constructing 200 more. Hine said he had seen the Rogers machine at the World casting "linotypes from molten metal" in a matter similar to the Mergenthaler machine. He said he had been told that orders had been received for "several hundred" machines to be installed in large numbers at New York City newspaper offices.[25]

Mergenthaler, who identified himself in his affidavit as a mechanic and instrument maker, stated that he had spent 14 years developing his machine. He said that at the time his machines "were given to the public there was no other machine in use, or before the public, having the same end in view." Mergenthaler also inspected the Rogers machine in New York, finding that it operated on the same general plan as his. He asserted that the Rogers was an "imitation of my own, and if permitted to enter the market, [it would represent] an invasion of my patents and an injury to my business, and that of my [patent] assigns."[26]

Affidavits from publishers and composing superintendents at the Courier-Journal, the New York Tribune and the Providence Journal stressed the "sharp new type" produced by the Linotype for each newspaper issue, reduced expenditures for foundry type, lowered composition costs and reduced composition time.[27]

The Mergenthaler interests were upheld by Federal Judge Henry Lacombe in his ruling of March 1891. He issued a preliminary injunction restraining the Press Publishing Company (the World's publishing company) from using the Rogers. In this case, National Typographic Company et al. v. New York Typograph Company et al., 46 F. 114 (1891),[28] the judge held that Mergenthaler's machine had been built under a foundation (or basic) patent that should be broadly

construed. He based his decision upon Mergenthaler's claim in his 1885 patent, No. 317,828, for a machine combining the composing and casting of individual matrices. (Mergenthaler had assigned his patents to the National Typographic Company, a predecessor company.)

Lacombe acknowledged that the Rogers machine "may be lighter, smaller, cheaper, more easily operated, and more efficient." But that was immaterial, he wrote, if the Mergenthaler "linotype" is covered by a foundation patent and if that machine "embodies a combination wholly new in the printing art, which marks the first great step in advance taken for over 400 years." The patent's validity was strengthened, the judge stated, by the investment of over $1 million in factories and machinery as well as the Linotype's use at newspapers with large circulations.[29]

After the injunction was announced, the ANPA advised members that the decision, unless reversed, "practically prevents the manufacture and use of all other machines known at the present time, which cast a one line type bar."[30] Although the ANPA could not predict the future, its forecast held true in the United States until after other basic Linotype patents expired in 1909.

At the time this infringement suit was before the court, the Typograph was illustrated and described in Inland Printer. The machines could be rented for $1 for each working day and $300 annually for weekly newspapers, with the company agreeing to keep them in repair. The Typograph used a Remington keyboard familiar to typewriter operators (in contrast to the Linotype's "etaoin" arrangement). The machine weighed only 450 pounds, considerably less than the Linotype's ton. Changes of type size and line length required a down time of about 20 minutes.[31] The Linotype sold for $3,000, while the Typograph was priced at $2,500.[32]

Apparently in response to the preliminary injunction, the Rogers company withdrew in May 1891 from the Pulitzer Building and shipped all its machines back to Cleveland. Journalist editor Allan Forman regretted seeing this action taken "because it looks as if one of the most important elements of the competition in mechanical composition would be constricted."[33] He was right.

The Rogers company, in the meantime, sought other avenues. It established factories in Canada and Germany, where its patents were not affected by the Lacombe decision.

The Rogers Typograph, as a combination machine, earned one further moment of glory in the United States. It was declared the winner in the six-day trials conducted for type composing machines by the ANPA in late 1891. The evaluating committee decided that the Typograph[34]

> produced the best and the most economical results. Its simplicity of construction was so great that it was set up ready for running in ninety minutes. For five consecutive working days no machinist or party than the operator had anything to do with the machine, and it ran smoothly, with scarcely a moment's interruption for the entire period of the test.

So here the Typograph was the winner over its more prominent rival, the Linotype, even though the Mergenthaler company had won an injunction barring the Rogers machine on infringement grounds. The contest itself was widely reported in the press and served to emphasize to publishers that the era of machine composition had already arrived.

Rogers, though, was following another ploy. In 1892 the Rogers Typograph Company of New York combined with the Electric Typographic Company to form the new Rogers Typographic Company. Through this consolidation, the Rogers forces gained the right to an electric typographic machine and to J. W. Schuckers' double-wedge spaceband, an acquisition that was to have a profound effect on the Linotype's future.[35]

Schuckers and His Spaceband

Before the history of the merged Schuckers-Rogers venture is reported, the background of the Schuckers mechanism will be related. Schuckers' impression-type composer was not a significant invention. His Mechanism for Justifying Composed Lines of Type was. This device, designed to work in conjunction with his composer, became important to the Linotype's history because it included "justifying bars" to provide equalized spacing for words in the line. The bar used a wedge and a wedge plate tapered in opposite directions. Schuckers, then living in Philadelphia, filed his patent application on 27 February 1885. Accounts of the invention indicate that no machine using its features was ever placed in production.

Forty-nine days after Schuckers' filing, Mergenthaler submitted his patent application for the second version of his Second Band Machine. To accomplish justification of its lines, Mergenthaler devised his "space-bars" consisting "each of two wedge-like portions tapered in opposite directions . . . united by a dovetail sliding connection." Mergenthaler's patent, No. 345,525, was issued 13 July 1886, and Linotypes built subsequently used this vital spaceband to justify the line. (See page 31.)

The Patent Office delayed issuance of Schuckers' patent for seven years while it was resolving the interference claims entered both by Mergenthaler and by Schuckers and his assignee, the Electric Typographic Company, over the priority of the spaceband concept. The Patent Office's examiner of interferences finally ruled in late 1891 that Schuckers was the first inventor.[36]

That ruling did not ruffle Mergenthaler's president Hine, then in his last month in office. The decision, he said, was "not of the slightest account to us, except so far as regards machines already manufactured and delivered."

He told the New York Times the decision would have no immediate effect because the company would be appealing it. He asserted, incorrectly as it turned out, that the "double wedge of Schuckers is no longer of the slightest necessity in the Mergenthaler machine." With bravado, Hine said the company owned other devices "equally practical."[37]

About this time the Schuckers owners (who may have even then included Rogers) began to agitate Mergenthaler officials by hinting at infringement suits over the use of the spaceband. Those innuendos prompted Journalist editor Forman to write that the Mergenthaler people "will now have an opportunity to see how it is themselves, so to speak, and taste the sweets of injunction." Because the double-wedge spaceband was a Mergenthaler strong point, Forman said, "things are looking squally" for the company. An injunction would be a "source of great inconvenience to publishers [with Linotypes] if the Schuckers people should take a notion to make trouble."[38] Publishers, of course, would not want their use of the Linotype (and production of their newspapers) threatened or halted by infringement suits.

Forman later said the Mergenthaler people claimed they "have their pockets full of justifying devices which are better." But those who had seen them had asserted that the "justifying spaces have a confusing habit of getting soldered together in casting the slugs so that they have to be distributed with a hammer. This mitigates against rapid composition."[39] In normal operation, the spacebands would separate automatically from the matrices and return to the spaceband box to be ready for re-use.

The Mergenthaler company did what Hine said it would as it appealed the damaging ruling to the Patent Office's examiner in chief and then to the commissioner of patents. In both instances Schuckers' priority was sustained.

His Mechanism patent, No. 476,306, was issued in May 1892, seven years after his original filing. Two months later the Rogers and Schuckers interests merged.

Rogers and Schuckers Together

In the merged Rogers Typographic Company, inventor Rogers became the mechanical director.[40] Now seeking to salvage his composing machine business, Rogers developed further the impression-type composing system based on his 1888 patent. He marketed it, and an 1893 Inland Printer advertisement described this new-style Rogers Typograph as a "line-of-type making machine which will save you money."[41] It did not state that this Typograph was now really three machines, so arranged to avoid the strictures of the 1891 preliminary injunction that restrained Rogers from combining all functions in one machine. Again advertising in Inland Printer, the Rogers company said a battery of 10 impression-type machines at the Detroit Journal reportedly saved that newspaper 50 percent in labor costs over equivalent hand composition.[42] (See page 32.)

Delegates to the 1893 ANPA convention in New York received copies of a Detroit Journal issue using the Rogers process as well as an invitation from the Rogers company to see the machines operating in Detroit. Publishers, seemingly, were not convinced, and one delegate spoke negatively about the Rogers system. F. Fayram of the Detroit Free Press asserted that the "average product of [the Journal machines] does not begin to compare with the Mergenthaler [product of the Free Press]." His criticism noted the requirement for three machines for composition.[43] It is doubtful that this Rogers system was installed at many newspaper offices. By the end of 1892, Linotypes were already installed in 24 states and the company was growing with a surge of orders.

In mid-1893 the preliminary injunction barring the use of the combina-

tion Rogers Typograph was made permanent. In Mergenthaler Linotype Company v. Press Publishing Company et al., 57 F. 502 (1893), Judge Alfred Coxe delivered an opinion that contained perhaps the most eloquent endorsement ever written about Mergenthaler's invention. After reviewing the history of previous composing machines, Coxe wrote:

> Neither singly nor combined could they do the work of the Mergenthaler machine. The skilled artisan would study them in vain for any suggestion of a "linotype." The idea is not there. The patents, then, were not anticipated. The court has no doubt that it involved invention to construct the patented machine. No one who has seen this wonderful machine, which, in operation, seems almost human, can doubt the truth of this proposition.

Judge Coxe held that Mergenthaler's patents should be liberally and broadly construed so as to "hold as infringers all who produce 'a linotype' by similar or equivalent combinations." He concluded that "Mergenthaler has made an invention of unusual merit and is entitled to reap the reward."[44]

Litigation over the combination machine finally ended in 1894. In an appellate court decision, Rogers Typograph Company v. Mergenthaler Linotype Company, 64 F. 799 (1894), Judge Marcus Acheson affirmed a New Jersey district court decision favoring the Mergenthaler company. Acheson drew upon the Coxe decision as he called Mergenthaler's combination "novel."[45]

That decision was not the end of the Rogers-Mergenthaler controveries. The prospect of serious litigation over the spaceband had become "more and more threatening" to the Mergenthaler company in 1893. President Philip T. Dodge pressed inventor Mergenthaler for a practical substitute for the double-wedge spaceband then being challenged by the Rogers interests. Dodge said the company considered the justifying device "an essential and necessary part of the machine, without which it would be inoperative." Dodge threatened to withhold royalty payments to Mergenthaler unless the Linotype was a "complete machine" free of infringements. In response to these commands, Mergenthaler developed

a single-wedge spacer with graduated steps and included this device in over 200 Linotypes he built at Baltimore. The new wedge did not work satisfactorily and Mergenthaler even admitted in his Biography that his "earnest and persistent efforts to invent [a substitute device] had not so far been crowned with success."[46]

Dodge's agitation, of course, stemmed from a legal salvo fired by the Rogers company. Rogers filed an infringement suit in a federal circuit court over the use of the spaceband. He sought an injunction, but Judge Marcus Acheson denied it in the preliminary hearing. In Rogers Typographic Company v. Mergenthaler Linotype Company, 58 F. 693 (1893), Acheson acknowledged that the previous interference proceedings over the spaceband at the Patent Office had favored Schuckers over Mergenthaler. He stressed that a judicial determination on the spaceband infringement issue would have to involve consideration of the "state of the art" at the time the contenders invented the mechanism. As a further ground against issuing even a preliminary injunction, Acheson wrote that such a ban against the Mergenthaler company "would cause serious injury" in view of its established business. To complainant Rogers, the injunction denial would cause "no irreparable damage" because he was not manufacturing a machine using the Schuckers patent. A final determination was to be made "on full proofs" at a later hearing."[47]

Rogers might have then sensed that further pursuit of an infringement injunction in a federal court would be futile. No citation has been found to indicate that any final hearing was held. Rogers, though, still held a powerful weapon to use against the Mergenthaler company: that 1891 Patent Office interference decision declaring that Schuckers was the first inventor of the double-wedge spaceband. In mid-1894 Rogers began to attack the Mergen-

thaler firm in a method that must have sounded some loud alarms in Brooklyn. Rogers filed infringement complaints against two Detroit newspapers, the Free Press and the Evening News, and threatened to bring suit against 100 or more newspapers using double-wedge spacebands in their Linotypes. The threats would obviously create a furore among current and prospective Linotype users. Publishers would understandably be bitter against the Mergenthaler company if an injunction forced them to revert to hand composition or to have their Linotypes converted to use an inferior spacing wedge that did not infringe upon the Schuckers spaceband patent.

Rogers' intentions stirred the ANPA to report the controvery. It circulated to its members a Minneapolis Times article, "Big Suit in Sight," stating that Rogers claimed[48]

> the spacing devices [used on the Detroit Linotypes] are the invention of Jacob[s] W. Schuckers of Philadelphia. . . . The Mergenthaler Company contested the issuance of the patent to Schuckers' invention, but the matter was decided against it.

The ANPA became even more concerned a month later when it advised its members that the pending Rogers suits[49]

> raised the question among Publishers as to what form of protection or guarantee the Mergenthaler Co. should give to papers using or contemplating the use of their machines. All expression of opinion from all members on this subject is earnestly desired in hopes that through the ideas thus garnered, some form of agreement may be arrived at with the Mergenthaler Co. that at least will protect the members of the association.

Subsequent bulletins did not reveal what measures, if any, the ANPA undertook after publishing that notice in September 1894.

The Mergenthaler Acquisition

The spaceband controversy ended abruptly a year later. In mid-1895 the Mergenthaler company bought out the Rogers firm for $415,000.[50] ANPA

bulletins, newspaper indexes, Fourth Estate and Inland Printer yielded no leads to any negotiation in the months preceding the consummation of the deal. It is entirely possible that the Rogers company carried out its threats to file infringement suits against other Linotype users. The Linotype's single-wedge spacer proposed by Mergenthaler was an unsatisfactory substitute for his double-wedge spaceband whose patent rights had been contested by Schuckers/Rogers. Newspaper owners likely made strong complaints to the Mergenthaler company, complaints so loud that purchase of the Schuckers patent became the only plausible solution. The complaints would have been justifiable, for by then over 2,500 Linotypes had been installed at nearly 400 printing offices or newspapers in the United States.

In addition to the spaceband rights and the Rogers company itself, the acquisition included the rights to Rogers' machines. Fourth Estate described the entire transaction as "a significant sale," revealing that only a small portion of the Rogers indebtedness would be paid out of the proceeds. Stockholders were to receive the balance "amounting to about 10 cents on the dollar."[51] Manufacture of the Rogers machines was discontinued with the move of the factory equipment from Detroit to Brooklyn.

The surprise ending came with the announcement that Rogers would figuratively cross the line from foe to friend. He joined the Mergenthaler staff, spending the rest of his life as consulting engineer and inventor in charge of the Brooklyn experimental department.

The New York Tribune reported that the transaction "would put an end to expensive litigation, and probably increase the business of manufacturing type machines."[52] (It did both.) The ANPA commented: "Members are all doubtless cognizant though the medium of the press dispatches, of the purchase by the

Mergenthaler Company of the Rogers Company."[53]

The Mergenthaler company's annual report for 1895 is not available (and one wonders what Dodge told the stockholders about the transaction). The ANPA, however, incorporated in a contemporary bulletin a Mergenthaler company notice stating that it had purchased the patents "mainly for the purpose of protecting publishers and relieving them from any fears." The company said it guaranteed "to protect any and every user of its machines against any claim for infringement from any source."[54]

By the 1896 Mergenthaler annual meeting, Dodge could say that "the wisdom of the purchase of the Schuckers-Rogers patents had been confirmed in many ways."[55] Although he did not explain his statement, the "wisdom" probably stemmed from the realization that the firm could now continue to build and market the Linotype with the proven and accepted spacing device. The company continued to grow as it manufactured an average of 850 Linotypes during the next 15 years. And since the double-wedge spaceband was an indispensable part of the Linotype, the acquisition of Schuckers' 1892 patent protected the integrity of the machine (at least in that aspect) until after the patent had run its course of 17 years.

To Mergenthaler, Rogers, like his machine was persona non grata. His Biography did not identify Rogers by his full name. Mergenthaler was obviously perturbed by the amount of the Rogers payment ($415,000) to which he applied both sarcasm--"enormous sum"--and irony--"modest little sum." The price, he wrote, was more than twice as much as the royalties he had received for his machines up to 1898 "and probably more than he or his family would ever be able to collect for his invention."[56] (Royalties eventually paid to Mergenthaler and his heirs reached an estimated $1.5 million.[57])

In his nearly 40 years at the Mergenthaler company, Rogers developed many significant improvements to the Linotype, among them the basic system for setting tables. Additionally, his linecasting Typograph formed the basis for the company's Junior Linotype introduced in 1902 in a renewed effort to supplant the use of typesetters with Linotypes.

After Rogers' death in 1934 at the age of 77, the Dictionary of American Biography credited him with[58]

> broadening the scope and increasing the usefulness of Mergenthaler's original . . . Linotype. He considered thousands of ideas submitted by machinists and operators and developed and refined those that were worth while, making them commercially profitable. In the course of his many years he patented between 400 and 500 devices in the field of composing machines. He was one of the few inventors whose ability yielded due financial reward, and this he used largely for the education of young people.

Schuckers, whose spaceband patent had been used as a threat to impede the progress of the Linotype, was not an active player in the maneuvers involving his invention. At an early date he had sold his patent application rights to Rogers for what the latter described as a "very small amount."[59] Schuckers was 61 when his justifier patent was finally granted. He died nine years later in 1901 while serving as secretary of the New Jersey commission of the Pan-American Exposition.

Rogers' linecasting Typograph, barred in the United States for many years because of the infringement injunction, was considered a successful machine in Canada, England and on the Continent. After the expiration of certain Linotype patents, U.S. manufacture resumed again about 1907 and continued for about five years. Because of its size, performance and slower speed, the Typograph was used largely by weeklies and small dailies.[60] No estimates are available as to the number of machines manufactured in the United States. Historians Legros and Grant reported, however, that in 1916 about 4,000 Typo-

graphs were in use worldwide, out of an estimated grand total of 44,000 hot-metal composing machines.[61]

Almost everyone benefited from the Mergenthaler company's purchase of the Schuckers spaceband patent. Linotype users--principally newspapers--were no longer placed on edge by threats of infringement suits and injunctions. The Mergenthaler company proceeded to manufacture an expanded number of Linotypes with that same threat removed. Rogers, who demonstrated business acumen by acquiring the patent and using it as a lever against the integrity of the Linotype, was able to sell his unsuccessful business and then fill an important niche at his former competitor. Although Mergenthaler complained about the amount spent for Schuckers' spaceband patent rights, he and his family would receive extensive royalties from machines built and sold unencumbered by that threat of infringement. Mergenthaler company stockholders could rejoice, for removal of this particular stumbling block would enhance the dividend payments that had begun only the year before. Only Schuckers, who had sold his patent rights to Rogers at an early date, appeared to be the loser among those involved with the transactions.

Summary

The search for a successful mechanical way to compose printer's type became, in the latter half of the Nineteenth Century, the passion of a loose coterie of dedicated inventors. Fueled by the desire for speedier and cheaper composition, they generated a spate of machines in several styles and with varying prospects of success. The fittest survived, at least until they too paled before the photocomposers of the next century.

U.S. newspapers, of course, stood at the center of a potentially enor-

mous market as they began to convert from hand to machine composition in the late 1880s and 1890s. The Mergenthaler Linotype Company, in its quest to gain and then retain superiority in an endeavor clamoring with competition, assiduously defended its patents when they were challenged. It went to court and won injunctions barring John R. Rogers' combination Typograph from U.S. markets. Yet when Rogers challenged the validity of Mergenthaler's spaceband, an expensive buyout became the strategy to forestall potential disruptions for Linotype users. That move helped to insure the Linotype's preeminence in the field and to place the machine in a monopoly position in the U.S. marketplace for well over a dozen years. It aided the diffusion and adoption of this innovation.

Newspapers of the era were vitally concerned with the possibilities of mechanized composition, and that topic abounded at conventions and in the trade press of the day. Could a machine really do what hands only had done for 400 years? If so, which machine/process would do it the best in order to gain faster and greater production, lower costs and higher profits? The "state of the art" in those days was one of rapid and exciting growth and change. The stakes--and the rewards--for a perfected composing machine were extremely high.

The Rogers-Mergenthaler controversies rose out of the confluence of some of those challenges. For the inventors, protection though the federal patent system could make or break a device. The system made a loser out of Rogers' combination Typograph, at least in the United States, but it served Rogers' ambitions in his challenge over the double-wedge spaceband. That the Mergenthaler company would spend $415,000 to acquire Rogers' unprofitable composing machine company and to eliminate the unnerving threat of Schuckers' spaceband demonstrates the degree to which mechanization and competitive forces had become entwined in the industry's economic and social fabrics.

Endnotes

[1]Nathan Rosenberg, "Technological Interdependence in the American Economy," Technology and Culture 20 (January 1979):25-50.

[2]Everett M. Rogers and F. Floyd Shoemaker, Communication of Innvovations, 2nd ed. (New York: Free Press, 1971), p25.

[3]Lucien A. Legros and John C. Grant, Typographical Printing-Surfaces (London: Longmans, Green, and Co., 1916; reprint ed., New York: Garland Publishing Co., 1980); Richard E. Huss, The Development of Printers' Mechanical Typesetting Methods, 1822-1925 (Charlottesville: University Press of Virginia, 1973); James Moran, The Composition of Reading Matter (London: Wace & Co., 1965); and John S. Thompson, History of Composing Machines (Chicago: Inland Printer Co., 1904; reprint ed., New York: Garland Publishing Co., 1980). See also Richard E Huss, Dr. Church's "Hoax" (Lancaster, Pa.: Graphic Crafts, 1976) and Richard E Huss, The Printer's Composition Matrix (New Castle, Del.: Oak Knoll Books, 1985).

[4]"Concerning Composition," New York Times, 11 August 1862, p5.

[5]The World article was reprinted in "Type-setting and Distribution Machine Wanted," Scientific American 20 (29 May 1869):343. In an editorial note, the magazine reported that "there is no machine for setting and distributing type that perfectly fills all the conditions required."

[6]Ottmar Mergenthaler, Biography of Ottmar Mergenthaler and History of the Linotype (Baltimore: 1898), p20.

[7]Mergenthaler Printing Company, Annual Report, 1888, p20.

[8]The growth and usage of the Linotype are described in George A. Everett, "The Linotype and U.S. Daily Newspaper Journalism in the 1890's" (Ph.D. dissertation, University of Iowa, 1972); and Corban Goble, "The Obituary of a Machine: The Rise and Fall of Ottmar Mergenthaler's Linotype at U.S. Newspapers" (Ph.D. dissertation, Indiana University, 1984).

[9]Ernest B. Chamberlain, The Churchills of Oberlin (Oberlin, Ohio: Oberlin Historical and Improvement Organization, 1965), pp45-46. Rogers was 18 years old when he graduated from both Berea and Oberlin in 1875.

[10]George Iles, Leading American Inventors (New York: Henry Holt & Co., 1912), pp430-31n.

[11]See James Eckman, The Heritage of the Printer (Philadelphia: North American Publishing Co., 1965), pp21-25; and Vance Gerry, The Ernest A. Lindner Collection of Antique Printing Machinery (Pasadena, Calif.: Weather Bird Press, 1971), pp35-36.

[12] Henry L. Bullen, "The Typograph and the Monoline Machines," Inland Printer 73 (April 1924):65-67.

[13] Mergenthaler, Biography, op. cit., p54.

[14] ANPA, Minutes of Annual Meeting, 1890, pp57-59.

[15]Bill of Complaint, Affidavits and Exhibits, The National Typographic Company v. the New York Typograph Company et al., pp15-16. This booklet of documents, hereafter cited as Bill of Complaint, is at the Library of Congress. It presents only the Mergenthaler side.

[16]Ibid., p14.

[17]"The Linotype," notice, first appearing in Inland Printer 7 (June 1890):848; and Journalist 11 (21 June 1890):16.

[18]John H. Farrell, "Type-setting Machines," Journalist 11 (21 June 1890):12.

[19]ANPA, Bulletin, No. 87, 4 October 1890.

[20]"A Revolution in Printing," Scientific American 63 (20 September 1890):176. By that time the magazine had published two comprehensive articles about the Linotype, but nothing of the same nature about the Typograph.

[21]"Larger Papers in Prospect," New York Times, 19 October 1890, p10.

[22]First appearing in the Journalist 12 (15 November 1890):16.

[23]Mergenthaler, Biography, op. cit., p56.

[24]Bill of Complaint, op. cit. Of four connected cases, the first, National Typographic Company v. New York Typograph Company et al., 44 F. 711 (1890), dealt not with infringement but with the residency of the defendants.

[25]Ibid., pp12-13. [26]Ibid., pp56-58. [27]Ibid., pp18, 21, 23-25.

[28]The Press Publishing Company was one of the defendants. The Lacombe decision was quoted extensively in "The Mergenthaler Wins," New York Tribune, 12 March 1891, p5, and in "Type-Setting Machines--Important Patent Decision," Scientific American 64 (28 March 1891):201.

[29]The decision was subsequently cited in several patent cases. One of these was Wright Co. v. Herring-Curtis Co. et al., 177 F. 257 (1910), in which an injunction was granted based on the plaintiff's claim of prior public acquiescence of its "heavier than air flying machines."

[30]ANPA, Bulletin, No. 100, 21 March 1891.

[31]"The Rogers Typograph," Inland Printer 8 (February 1891):459-60.

[32]P. D. Ross, "Type-casting Machines," Popular Science Monthly 40 (December 1891):184.

[33]"By-the-Bye," Journalist 13 (2 May 1891):8.

[34]"Machine Composition," New York Times, 15 January 1892, p3.

[35]"Type-setting Machines Combine," Journalist 15 (2 July 1892):15.

[36]"An Important Decision," New York Times, 11 December 1891, p2. Little is known about the Electric Typograph. No description appears in histories by Thompson, Legros and Grant, and Huss, an indication that it never reached a marketable stage. The Times article indicated that the device was an impression machine with an electrically operated keyboard that could activate similar machines in other locations. Schuckers had assigned his patent to that company, but there no evidence to show that this Typograph incorporated any of his devices.

[37]Ibid.

[38]"By-the-Bye," Journalist 14 (20 February 1892):8.

[39]"The Status of Machine Composition," editorial, Journalist 15 (2 July 1892): 8.

[40]"Type-setting Machines Combine," Journalist, 15 (2 July 1892):15.

[41]"The Rogers Typograph," advertisement, Inland Printer 10 (March 1893):537.

[42]"The Rogers Typograph," advertisement, Inland Printer 13 (April 1894):13.

[43]ANPA, Minutes of Annual Meeting, 1893, p27.

[44]Over a dozen federal cases have cited the Coxe decision, one judge describing its principles as a "doctrine of pioneership" (Westinghouse v. New York Air Brake Co., 59 F. 581 (1893)).

[45]No citation has been located for the New Jersey case. Arguments were heard in October 1891, according to "Millions Are Involved," New York Times, 29 October 1891, p1.

[46]Mergenthaler, Biography, op. cit., pp63-64. He said royalty payments were delayed 11 months.

[47]A six-line report of the denial appeared in "A Victory for the Linotype Company," New York Tribune, 30 November 1893, p9.

[48]"Big Suit in Sight," Minneapolis Times article, probably 29 July 1894, quoted in ANPA, Bulletin, No. 276, 1 August 1894.

[49]ANPA, Bulletin, No. 281, 7 September 1894.

[50]"Bought by the Linotype Company," New York Times, 16 July 1895, p8. Mergenthaler, in his Biography, p65, said the sum was $416,000.

[51]"Significant Sale," Fourth Estate 3 (18 July 1895):1.

[52]"Absorbing a Rival Company," New York Tribune, 17 June 1895, p12.

[53]ANPA, Bulletin, No. 335, 19 July 1895.

[54]ANPA, Bulletin, No. 349, 31 October 1895.

[55]Mergenthaler Linotype Company, Annual Report, 1896, p7.

[56]Mergenthaler, Biography, op. cit., pp64-66.

[57]Thomas Dreier, The Power of Print--and Men (Brooklyn, N.Y.: Mergenthaler Linotype Company, 1936), p34.

[58]Dictionary of American Biography, 1935 ed., v16, pp105-06. Rogers was a trustee of both Berea and Oberlin colleges; both awarded him honorary doctorates. To Berea College he donated funds for a dormitory and an art building in honor of his parents. He was instrumental in obtaining (or giving several Linotypes and other printing equipment to the Berea College Press. Rogers is buried at the Berea Cemetery, where his tombstone calls attention, among other accomplishments, to his service as "Inventor and Perfecter of the Linotype."

[59]"John R. Rogers, Perfecter of the Linotype, Dies," New York Herald Tribune, 19 February 1934.

[60]Eckman, op. cit., pp21-25. Eckman said a modernized Typograph was built in Germany in the 1960s. At least two Typographs can be seen in museums. They are located at the Lindner Press, Los Angeles, and the Henry Ford Museum at Dearborn, Mich.

[61]Legros and Grant, op. cit., p572.

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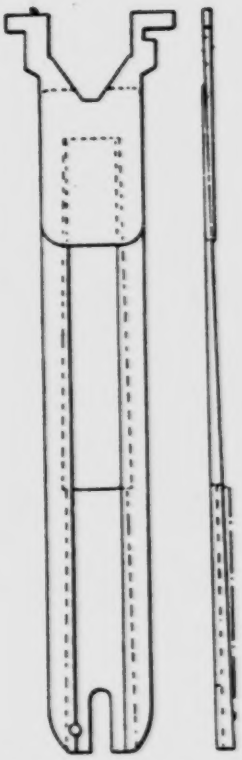
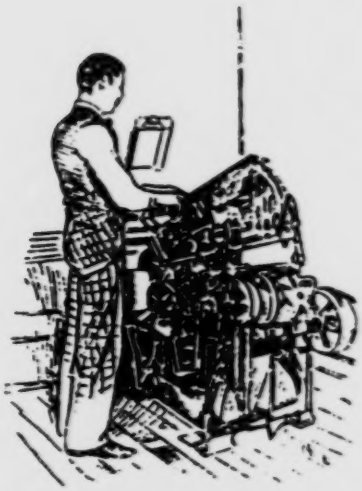


DOUBLE-WEDGE SPACEBAND

Legros and Grant, p231



ROGERS TYPOGRAPH
(combination model)

Inland Printer 9 (November 1891):392

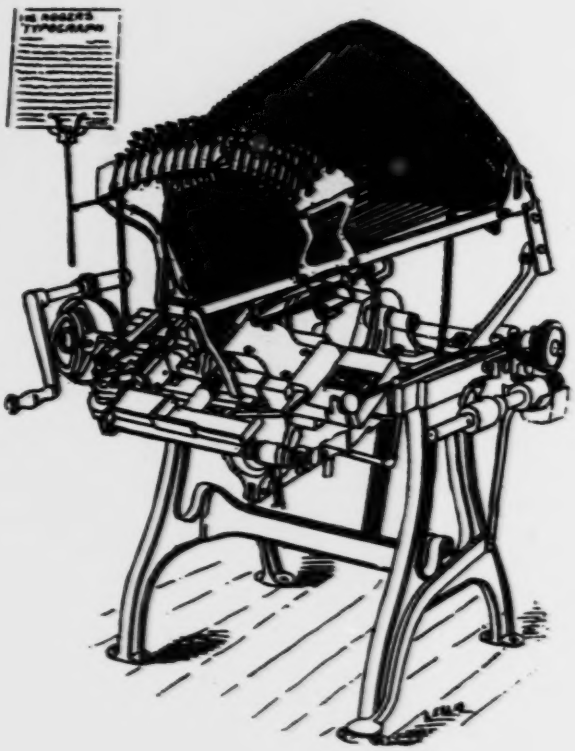
MERGENTHALER LINOTYPE

Inland Printer 9 (November 1891):391

At right....

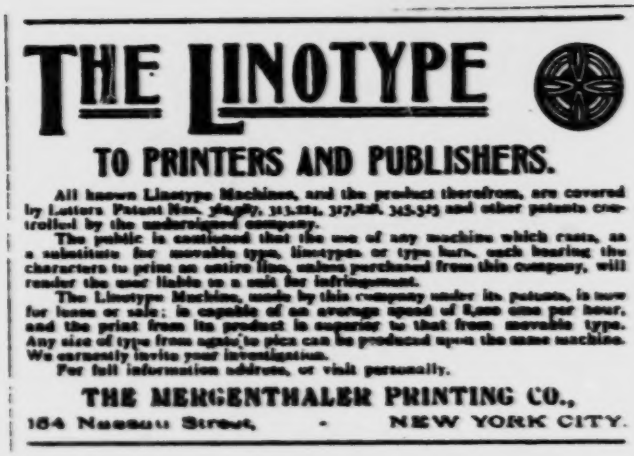
JOHN R. ROGERS

Chamberlain, p45



ROGERS TYPOGRAPH
(impression-type model)

Eckman, p23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Inland Printer 7 (June 1890):848

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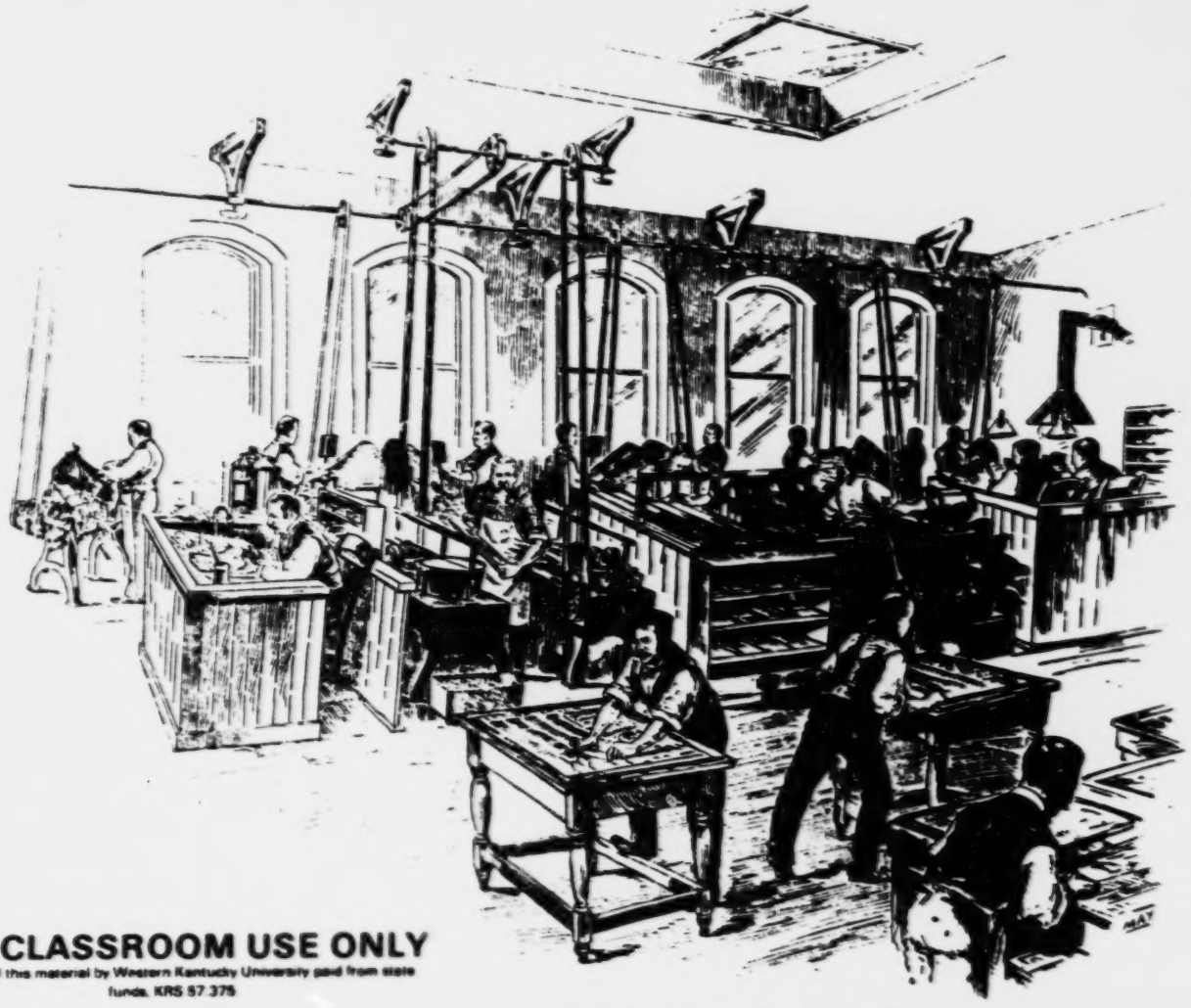

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